Selective Soldering System

The world's leading provider of selective soldering machine
Content

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2. Sasinno’s machine models brief explanation.
3. Sasinno selective soldering system's highlights.
4. Application: Ant-i1 Comparison with Soldering robot
5. Application: Mas-i2 + Flex-i2 Comparison with wave solder
1. What is selective soldering? how does it work?

Key words:
- Difference with wave solder
- Drop jet fluxer
- Selective solder pot
- Flexibility
What is selective Soldering System

Selective Soldering Machine is formed by 3 processes as below.

➤ **Selective spray flux part:**
It can do selective flux spraying to a required position on the PCB.

➤ **Preheating part:**
It will heat up the PCB and activate flux performance.

➤ **Selective soldering part:**
It can selectively solder to the required pad on the PCB.
Flux Spraying system

Drop Jet Flux sprayer
Jet flux spraying nozzle, moving under the PCB on a programmed path, spray flux to selected area under PCB.

Jet sprayer

Drawing path on image
Flux Spraying system -- quick programmer
Flux Spraying system--drop jetting
Preheating system

PCB will be preheated by a bottom preheating zone and also a top preheating zone. Be sure flux is fully activated.

For some special joint, N2 heating will help to preheat the pads too.
Soldering system

Solder pot under the work of X/Y/Z moving table, melting soldering come from standard or customized nozzle, moving under the PCB as programmed path, soldering to required components at PCB.
Soldering system--solder pot&nozzle
2. Sasinno's machine models brief explanation

We now know selective soldering is formed by selective fluxing, preheating and selective soldering. For different machine solution, It’s a different combination of flux/preheat/soldering modules.

Now we will introduce Sasinno's most popular 3 machines.

<table>
<thead>
<tr>
<th>Ant-i1</th>
<th>Flex-i2</th>
<th>MAS-i2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small offline with big potential?</td>
<td>Good flexibility?</td>
<td>Mass production?</td>
</tr>
</tbody>
</table>
MODEL: Ant-i1
OFFLINE SELECTIVE SODERING MACHINE

Best replacement for soldering robot process !!!
Best choice for small batch offline production and NPI.

Ant-i1 is a compact offline selective soldering machine. PCB is moved x/y with servo motor, Solder pot and flux sprayer move in Z direction.

Descriptions:

- Compact footprint W860mm x D1256mm.
- Max PCB size L350mm x W260mm, if rotates the board 180 degree and solders twice, max board L700mm x W260mm.
- Windows 10 based English software, easy programming.
- X/Y/Z table is driven by servo motor & servo driver.
- Standard equipped with drop jet fluxer made in Germany.
- Standard equipped with bottom preheat zone.
- Standard equipped with "n2" heating system.
- Standard equipped with Titanium solder pot, best choice for lead free solder.
- Standard equipped with live camera to show soldering process.
- Standard equipped with auto wave height calibration.
MODEL: FLEX-i2
Compact In Line Selective Soldering Machine

Flex-i2 is the new generation selective soldering machine with the following features:

High Flexibility, Compact inline !!!

- Windows 10 system English version.
- Inline conveyor, SMEMA connection.
- One module, fluxing/soldering sharing the same XY motion table.
- Standard equipped with one drop jet fluxer made in Germany, Optional for 2nd drop jet fluxer.
- Standard equipped with top & bottom preheat zone
- XY servo table for solder station, servo axis Z1 for solder pot 1, servo axis Z2 for solder pot 2.
- Optional with electro-magnetic pump made in Germany.
- Standard equipped with "n2" heating system.
- Standard equipped with Titanium solder pot, best choice for lead free solder.
- Standard equipped with live camera to show soldering process.
- Standard equipped with auto wave height calibration.
MODEL: FLEX-i2
Compact In Line Selective Soldering Machine

Individual Z axis at each solder station.

Software:
Can sequentially use solder pot 1 & solder pot 2 or use them simultaneously for double production.
Can use one fluxer for all pads or use two fluxer to double production.
MODEL: FLEX-i2
Compact In Line Selective Soldering Machine

Various Soldering Application

Z axis individual run, can equip with different nozzle. For different application like First pot 1 then pot 2 for soldering or first pot 2 then pot 1, or one solder working and another standby waiting for next programmed board.
MODEL: FLEX-i2
Compact In Line Selective Soldering Machine

Various Soldering Application

Two of the same nozzles. For same PCB in carrier. Solder two boards at the same time to double production.
## High Flexibility, Compact inline !!!

<table>
<thead>
<tr>
<th>Factory Status</th>
<th>Machine application</th>
<th>Advantagous</th>
</tr>
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<tbody>
<tr>
<td>Small volume, many different board. Two different flux, two different solder</td>
<td>Each drop jet flux with one tank, each tank with one kind of flux. Each solder pot with one solder.</td>
<td>When changing process from board A to board B, no need to spend time to load different flux and different solder, easy to exchange process in 10 minutes.</td>
</tr>
<tr>
<td>Middle volume, high mixed components (big different heat absorbing character)</td>
<td>use bigger solder nozzle to solder big components, grounded point, heat sink etc.</td>
<td>Tailor-made process, easy to get good soldering quality and volume.</td>
</tr>
<tr>
<td>Higher volume (may use two set of Flex-i2 or one MAS-i2 plus one Flex-i2)</td>
<td>use same solder nozzle to solder two same board together</td>
<td>Double the production</td>
</tr>
</tbody>
</table>
MODEL: MAS-i2
In line Selective Soldering System

MAS-i2 is the new generation selective soldering machine with the following features:

**High Flexibility, High output !!!**

- Windows 10 system English version.
- Inline conveyor, SMEMA connection.
- 3 independent modules inside machine, fluxing with its own motion XY table.
- Standard equipped with one drop jet fluxer made in Germany, Optional for 2nd drop jet fluxer.
- Standard equipped with top & bottom preheat zone.
- XY servo table for solder station, servo axis Z1 for solder pot 1, servo axis Z2 for solder pot 2.
- Optional with electro-magnetic pump made in Germany.
- Standard equipped with "n2" heating system.
- Standard equipped with Titanium solder pot, best choice for lead free solder.
- Standard equipped with live camera to show soldering process.
- Standard equipped with auto wave height calibration.
MODEL: MAS-i2  
In line Selective Soldering System

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<td>High volume</td>
<td>use same solder nozzle to solder two same board together</td>
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3. Sasinno selective soldering system's highlights

Now we will show our difference to other competitors

Software: Easy to operate, full traceability, full monitoring.
Hardware: Robust parts, core parts imported from Germany.
Design: Convert 10 years machines experience to design.
Brand introduction

With more than 10 years soldering process experience, Sasinno really knows the customer’s needs.

In Sasinno’s products, we convert our experiences of soldering to programmable & traceable software designed to reduce solder quality issues, instead of just relying on the engineer’s experience, now relying more on the machines technology.

For core hardware purchasing & design, it’s done at our Europe technical center which is located in Archen, Germany.

We have a global sales & service channel, no matter where you located, we have always distributor or factory’s engineer to support you.

Enjoy the innovated steady technology !!!
Robust hardware--Motion System

X/Y/Z axis adopt Japanese made Servo motor and driving system.

X/Y/Z axis are equipped with high-precision ball screws and linear guide rails, increasing the work accuracy up to +/ - 0.05 mm

Fully sealed module, isolate motion parts from flux particles.
Robust hardware--Conveyor System

Ball screw for auto width adjusting

SMEMA for in line conveyor system.

Sealant cover for ball screw, avoid flux corrosion.

Stainless steel rollers conveyor runs smoothly, with a clamping device which makes the edge clearance of the PCB reach 3 mm and ensure positioning accuracy.

With a side clamping system, when PCB arrives in position, side clamping air cylinder will clamp the board. For excellent repeatability.
Robust hardware--**Flux System**

Drop jet fluxer nozzle, made in **Germany**.

**120um nozzle hole**, more than 100 times on/off capability in 1 second

Can generate 4mm to 8mm width at PCB
Solder tank is made of **Titanium**

**N2 direct heat up system**, with close loop temperature control for N2.

Meanwhile, with **N2 pressure & flow monitoring** in software. For many machines in the market, the N2 temperature is not controllable.

**Servo motor & driver** for wave control.
**MUCH Less maintenance** compared with other international brand mechanical pump:

**Other mechanical pump** requires cleaning in the solder bath every week as per the left list, (5 days x 8 hours/day = 40 hours)

SASINNO mechanical pump only needs cleaning in the solder bath every month (5 days x 8 hours/day x 10 = 400 hours). It's 10 times better than our competitors.

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**Soldering System: Much less maintenance mechanical Pump**

**MAINTENANCE**

**SCHEDULED MAINTENANCE.**

The Recommended Maintenance Schedule for the machine is detailed below. It includes Daily, Weekly and Monthly tasks which are simple to execute by an experienced engineer.

**IMPORTANT NOTE:** Where more than one Shift is worked per day, it is recommended that all Daily Scheduled Maintenance Tasks are implemented once per Shift. Also, dependent upon machine usage and nozzle selection, some daily tasks such as tuning the nozzle may have to be monitored periodically during production and undertaken when necessary.

<table>
<thead>
<tr>
<th>TASK</th>
<th>DAILY</th>
<th>WEEKLY</th>
<th>MONTHLY</th>
<th>INSTRUCTIONS</th>
<th>ESTIMATED TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solder nozzle</td>
<td>☒</td>
<td></td>
<td></td>
<td>Clean Surface and re-tin if necessary</td>
<td>5 MINS</td>
</tr>
<tr>
<td>Solder bath (Quick)</td>
<td>☒</td>
<td></td>
<td></td>
<td>Clean Surface dress by removing nitrogen shroud</td>
<td>5 MINS</td>
</tr>
<tr>
<td>Clean nozzle sleeve</td>
<td>☒</td>
<td></td>
<td></td>
<td>Remove nozzle and clean dress from sleeve</td>
<td>2 MINS</td>
</tr>
<tr>
<td>Flux head</td>
<td>☒</td>
<td></td>
<td></td>
<td>Using a cotton bud and alcohol to clean the top of the fluxer</td>
<td>1 MIN</td>
</tr>
<tr>
<td>Solder bath (Thorough)</td>
<td>☒</td>
<td></td>
<td></td>
<td>Remove pump body from bath and de-dross entire bath</td>
<td>20 MINS</td>
</tr>
<tr>
<td>Camera lens</td>
<td>☒</td>
<td></td>
<td></td>
<td>Clean off flux residue with lens cleaner and lint free cloth</td>
<td>1 MIN</td>
</tr>
<tr>
<td>Solder bath temperature</td>
<td>☒</td>
<td></td>
<td>☒</td>
<td>Calibrate Solder Temperature at Nozzle (make sure the pump has run for at least 15 minutes)</td>
<td>20 MINS</td>
</tr>
<tr>
<td>X &amp; Y axis</td>
<td>☒</td>
<td></td>
<td>☒</td>
<td>Check for debris on rack and grease with super lube, check rails and oil with PTFE spray.</td>
<td>15 MINS</td>
</tr>
<tr>
<td>Linear nozzle</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>Remove the plate and pin</td>
<td>10 MINS</td>
</tr>
</tbody>
</table>

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**7. Re-Assemble Pump**

- With impeller-shaft assembly and pulley in place, insert shim gauge (perpendicular to shaft) between ouillev support bearing and bronze washer. Refer to the picture.
Robust hardware—**Soldering System: electromagnetic pump**

Wearless electromagnetic pump, no pump/impeller, no maintenance, pump coil is made in Germany.
Easy use Software system: main working page

Path indication
Mark point checking
Manual moving zone
Path pre-test
Main parameters setting
Manual switches
Fully monitoring Software system

Different working model

Set the machine to work with different models

Full monitoring

Monitor air pressure, N2 pressure, temperatures etc key parameters in real time by software
Software system--**Ful information of program**
Full consumable information like flux material, flux nozzle, solder material solder nozzle can pick up from “materials” database, and this information will be included to the program as package information.

Main parameters can be set here too, same as the main production page.
Software system--Fully information of program

1. Path sequence changeable
2. Each site can be with different Z working height and wave height, giving max flexibility for soldering performance
3. Cycle Time estimation

- Path editing
  - path's color and width related to chosen nozzle which set in "material" database.
  - Can simulate actual solder's width

Fiducial checking capable
Customer can add all their “flux information” “solder information” “flux nozzle information” “solder nozzle information” here. And when creat program for board, can choose to use which flux, solder, flux nozzle, solder nozzle. And these information will be included in the program. To get good traceability in future for repeat products production.
Software system: log page

- Login level with different rights
- Logs check
4. Application:
Ant-i1 Comparasion with Soldering robot

Before we make some comparasion, this is the initial idea you may have:
1. Selective soldering is too expensive! I can't get investment back!
2. Soldering robot is cheaper and easy to use, more saving cost!

Let's do some math now!
## Ant-i1 Comparasion with Soldering robot

<table>
<thead>
<tr>
<th></th>
<th>Selective soldering (Ant-i1)</th>
<th>Soldering robot (quanlity brand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Soldering quality</td>
<td>Top level</td>
<td>Middle</td>
</tr>
<tr>
<td>Solder fill up</td>
<td>Good</td>
<td>poor</td>
</tr>
<tr>
<td>Programming time (easy to use)</td>
<td>10 minutes (no matter even more sites)</td>
<td>40 minutes or much more (teaching site one by one)</td>
</tr>
<tr>
<td>Programming traceability</td>
<td>Full traceability like flux, solder, temperature, motion, N2 pressure, operator, machine mainenance etc</td>
<td>Only motion path</td>
</tr>
<tr>
<td>Machine cost</td>
<td>Competitive with quality brand soldering robot in the world</td>
<td></td>
</tr>
<tr>
<td>Cost effective</td>
<td>The more it's used, the more cost effective</td>
<td></td>
</tr>
</tbody>
</table>
# Yearly usage cost

<table>
<thead>
<tr>
<th></th>
<th>Selective soldering (Ant-i1)</th>
<th>Soldering robot (quantity brand)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Usage Cost per year</strong></td>
<td>Let estimate machine work 8 hours per day, 26 days per month, 12 months per year. Every day use 1 kg solder. One year it will be around 2500 working hours and 310 kg solder.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Flux cost** | Alpha flux  
usd60/barrel 18 kg  
usd60/kg * 3 = usd180 | 0 | 0 | Selective solder use liquid flux |
| **Solder cost** | SAC 305  
usd44/kg  
usd44/kg * 310 kg = usd13640 | 0 | 0 | Selective solder use solder bars |
| **Solder dross** | SAC 305  
usd44/kg  
usd44/kg * 0.1 * 26 days * 12 months = = usd1372 | 0 | 0 | Selective solder generate max 100 gram solder dross per day |
| **Solder wire cost**  
(solder wire with flux) | 0 | SAC 305  
usd50/kg  
usd50/kg * 310 kg = usd15500 | 0 | 0 | Soldering robot use solder wire. |
| **Pallet price yearly** | 0 | 2pcs x USD350/unit = USD700  
USD7000 x 50% = USD3500 | 0 | 0 | Selective solder usually no need carrier. Soldering robot at least need 2 pieces carrier for each board. For example customer solder 10 different board. Carrier lifetime is 2 years. |
| **Electricity consumption** | 6 kw | 6 kw x 2500 hours x USD0.07/kwh = USD1050 | 1 kw | 1 kw x 2500 hours x USD0.07/h = USD175 | 5 KW for Ant-i1 electricity already include the N2 generator’s power consumption |
| **Solder nozzle** | USD50/unit lifetime is 1 months | USD50 x 12 = USD600 | 0 | 0 |
| **Solder tip** | 0 | USD15/unit lifetime is max 2 days (16 hours continues working) | USD15 x 26 x 12 /2 = USD2340 |
| **Total per year** | **16842** | **21515** |
Conclustion

Because of the big price difference for solder bars and solder wire, If the machine is working 2500 hours per year, using a lot of solder, ANT-i1 can save more than 17k USD usage cost per year.

At the same time, customer will get better soldered quality board (this cost not calculated in previous list. So bad soldering quality repairing cost was not even calculated in previous list yet).

If machine not used regularly but for NPI, it will also save a lot of time. Engineer don’t need to wait for a customized carrier to the start soldering test.
5. Application:
Mas-i2 + Flex-i2 Comparasion with wave solder
## Mas-i2 + Flex-i2 Comparasion with wave solder

<table>
<thead>
<tr>
<th></th>
<th>MAS-i2 + Stamping soldering (multi nozzle)</th>
<th>Wave solder (famous brand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Soldering quality</td>
<td>Top level</td>
<td>Middle</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Good</td>
<td>No, all components solder with same parameters</td>
</tr>
<tr>
<td>Programming time (easy to use)</td>
<td>10 minutes (no matter even more sites)</td>
<td>10 minutes (no matter even more sites)</td>
</tr>
<tr>
<td>Programming traceability</td>
<td>Full traceability like flux, solder, temperature, motion, N2 pressure, operator, machine maintenance etc</td>
<td>No, only temperature &amp; conveyor speed, wave height</td>
</tr>
<tr>
<td>Machine cost</td>
<td>Competitive with famous wave solder brand in the world</td>
<td></td>
</tr>
<tr>
<td>Cost effective</td>
<td>Much move saving</td>
<td></td>
</tr>
</tbody>
</table>
## Mas-i2 + Flex-i2 Comparison with Wave Solder

<table>
<thead>
<tr>
<th></th>
<th>MAS-i2 + Stamping Soldering (multi nozzle)</th>
<th>Wave Solder (International brand)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Usage Cost per year</strong></td>
<td>let estimate machine work 8 hours per day, 26 days per month, 12 months per year. Let's estimate PCB use 1000kg solder (note: means 1000kgs solder to PCB’s joint, not mean add 2000kgs solder to solder pot)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Flux cost</strong></td>
<td>Alpha flux usd60/barrel 18kg</td>
<td>Alpha flux usd60/barrel 18kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>usd60/kg * 6 = usd360</td>
<td>usd60/kg * 6 * 10 = usd6000</td>
<td>For wave solder, the flux usage is at least 10 times than selective soldering</td>
</tr>
<tr>
<td><strong>Solder cost</strong></td>
<td>Alpha SAC 305 usd50/kg</td>
<td>Alpha SAC 305 usd50/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>usd50/kg * 1000kgs = usd50000</td>
<td>usd50/kg * 1000kgs = usd50000</td>
<td>Both machine use solder bar. Solder used in PCB is same quantity</td>
</tr>
<tr>
<td><strong>Solder dross</strong></td>
<td>Alpha SAC 305 usd50/kg</td>
<td>Alpha SAC 305 usd50/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>usd50/kg * 0.5 * 26 days * 12 months = usd7800</td>
<td>usd50/kg * 3 * 26 days * 12 months = usd46800</td>
<td>MAX-i2 generate 0.2kg solder and stamping soldering generate 0.3kg per day, total it's 0.5kg. For wave solder, it's at least generate 3 kg per day solder dross.</td>
</tr>
<tr>
<td><strong>Electricity consumption</strong></td>
<td>15kw</td>
<td>20kw</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15kw x 2500 hours x USD0.07/kwh = USD2625</td>
<td>20kw x 2500 hours x USD0.07/kwh = USD3500</td>
<td>15KW for selective plus stamping soldering and N2.</td>
</tr>
<tr>
<td><strong>Solder nozzle</strong></td>
<td>USD120/unit life time is 1 month</td>
<td>USD120 x 12 X 2 = USD2880</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Because MAS-i2 with 2 nozzle</td>
<td></td>
</tr>
<tr>
<td><strong>Stamping solder nozzle</strong></td>
<td>USD500/unit life time is 12 months</td>
<td>USD500</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total per year</strong></td>
<td><strong>64165</strong></td>
<td><strong>103900</strong></td>
<td></td>
</tr>
</tbody>
</table>
Mas-i2 + Flex-i2 Comparison with wave solder

Conclusion

For usage cost, because of saving 90% flux usage, you save solder dross, every year the selective combination can save USD 40k less than a wave solder machine.

Quality wise, wave solder provide all same temperature, soldering speed to all components on the board. So the good soldering quality window is quite small. For selective soldering, it can set soldering speed and wave height for each different component, it’s more feasible to get good soldering quality.

Note: Not all boards need this solution as with wave solder it can be replaced by MAS-I2 plus stamping soldering.

If the board is full of THT components, and you are only looking for high production to lower cost, wave solder is still a good choice.

Your welcome to provide your various boards to us for evaluation the possibility, even if the board is designed for wave solder!
1st Generation of machine-- year 2012--2015

Machine installed for German customer CADSERVICE in Brazil factory, Korea KIA, Omron factory in China, etc.
2nd Generation of machine-- year 2015--2018

Machine installed for USA Artysern factory, FlexCircuit factory, Johnson motor etc.
3rd Generation of machine-- year 2019--

Machine installed in USA
JPC medical electronics,
USA Adam motors etc.
For more information please contact

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